



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

August 27, 2015

Mike Medieros
Manager, Renewable Energy Development
Pacific Gas and Electric Company
245 Market Street, Room 1309
San Francisco, CA 94105

Re: **Underground Injection Control (UIC) Permit
Class V Experimental Well, R9UIC-CAS5-FY13-1
Pacific Gas and Electric Company (PG&E)
Review of PG&E Documents**

Dear Mr. Medieros:

This letter is to notify you that the EPA has completed its review of the following four documents: 1) Response to EPA's Comments on the April 2015 Monthly Report and Review of dated June 8, 2015; 2) Annular Pressure- Temperature Relationship Evaluation Memorandum, dated July 8, 2015; 3) PG&E's Response to Comments on the May 2015 Monthly Report dated July 23, 2015; and 4) May 1-3, 2015 FOT Report (June 2, 2015) dated July 23, 2015. Our comments on each of these documents are provided on the Enclosure.

Please contact me or Michele Dermer of my staff at (415) 972-3417 if you have any questions.

Sincerely,

A handwritten signature in blue ink, appearing to read "D. Albright".

David Albright
Manager
Drinking Water Protection Section

Enclosure

cc w/ enc.: Mike Woods, CA DOGGR, District
Anne Olson, Regional Water Quality Control Board, Central Valley Region

Enclosure

A. Review of PG&E's Response to EPA Comments on the April 2015 Monthly Report for the PG&E Test Injection/Withdrawal Well 1 dated July 8, 2015

1. Including the updated testing results evaluation in the quarterly reports is acceptable.
2. The thermal decay lithology log, temperature log, and bottomhole pressure (BHP) survey report were provided as requested. Please respond to the following comments:
 - a. The Piacentine 1-27 well thermal decay lithology log may show an anomaly at a depth of 4,670 to 4,610 feet, potentially as high as 4,570 feet. *Please provide an explanation of the log response at this depth.*
 - b. The temperature log indicates an increase in temperature at the MRF reservoir depth, which is indicative of the air bubble reaching the Piacentine 1-27 well. The horizontal temperature scale is broad, and may not be sensitive enough, at 60 to 179 degrees F (approx. 13 degrees per inch) to discern more subtle temperature gradient changes. The EPA Temperature Logging Requirements document specifies a scale of 1 to 2 degrees per inch. Also, the complete gamma ray log trace from total depth to the surface was not provided on the log. Nonetheless it appears that there are no anomalies above the MRF reservoir, which would indicate an absence of fluid movement out of the MRF reservoir and into or between USDWs. *Please provide the log with the complete gamma ray log trace as required by the permit.*
 - c. The two BHP survey reports consisted of Excel spreadsheets of the raw pressure and temperature data versus time, however the pressure gradient survey data used to convert the surface pressure to BHP is not included. *Please provide the pressure gradient survey for the Piacentine 1-27 well.*

B. Comments on the June 8, 2015 Update Evaluation of Annular Pressure – Temperature Relationship in the PG&E Test Injection/Withdrawal Well 1

1. Response is acceptable. PG&E is correct that Part II.D.2.b.iii of the permit requires an internal mechanical integrity test (MIT) be conducted in the Piacentine 1-27 observation well *at the conclusion* of the CAES post-test monitoring period. *There are no revisions to this permit requirement.*

C. Comments on the PG&E Responses to EPA Comments on May 1-3 Fall-off Test (FOT)

1. In this version of the FOT report PG&E presents 2,080.2 psia as the initial reservoir pressure (P_i) at the top of the Mokelumne River Formation (MRF) reservoir for the I/W Test Well 1. A P_i of 2080.2 psia compares with the initially calculated value of 2,050 psia at the same depth (4,671 feet true vertical depth), presented in the May 1-3, 2015 Fall-off Test report dated June 2, 2015. In addition, that value, 2,050 psia, was used in the Area of Review evaluation in the UIC permit application, based on the estimated depth to the top of the MRF reservoir of approximately 4,670

feet at the proposed I/W Test Well 1 location as depicted in Figure F-13 in the permit application. The precise value for P_i is difficult to determine since the calculation of P_i was based on short duration surface shut-in pressures and uncertain well conditions at the time the pressure readings were recorded.

The originally presented P_i value of 2,050 psia was based on an initial reservoir pressure gradient of 0.439 psi/foot in the Moresco et al Unit A-1 discovery well, which was also the basis for the modeling and zone of endangering influence (ZEI) evaluations presented in the UIC permit application; and later in conjunction with the FOT ending on October 28, 2014. In addition, the P_i of 2,050 psia more closely represents the current pressure gradient of 0.437 psi/foot in the lowermost underground source of drinking water (USDW) in the overlying Domengine Formation. P_i in the MRF reservoir is important for comparison to reservoir pressure behavior, while the current pressure gradient in the lowermost USDW is the more critical parameter to be used to enforce, if necessary, the permit requirement to plug and abandon the I/W Test Well 1, and possibly perform a ZEI re-evaluation when the MRF reservoir pressure stabilizes during the post-test period. *Based on the information provided, EPA does not accept the proposed increase of the estimated initial reservoir pressure from 2,050 psia to 2080.2 psia. P_i remains at 2050 psig.*

D. Comments on the Responses to EPA Comments on the May 2015 Monthly Report

1. Response is considered acceptable.
2. Response is acceptable. PG&E provided copies of the thermal decay lithology log, temperature logs, and the BHP surveys that were run in the Piacentine 1-27 well, as requested. *In addition to copies of the logs and BHP survey data, EPA requests an interpretation of the thermal decay lithology log and a copy of the pressure gradient survey as noted in comment A. 2. a and c, above.*